European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.1341050 Volume 4 | Issue 12 | 2018

THE IMPACT ON TECHNOLOGY INTEGRATION SELF-EFFICACY BELIEFS OF PROSPECTIVE TEACHERS' SELF-DIRECTED LEARNING TRENDS WITH TECHNOLOGY

Ebru Bakaç[i]
Sinop University,
Faculty of Education,
Turkey

Abstract:
The purpose of this research is to determine the effect of self-directed learning tendencies of prospective teachers on the self-efficacy beliefs of technology integration. In addition, prospective teachers' opinions of technology integration were researched. The research was designed using a mixed method. The study group of the research consisted of prospective teachers (pre-test n = 170 and post-test n = 131) who are studying at the Faculty of Education located in Northwest Black Sea Region of Turkey during the spring semester of the 2016-2017 academic year and who are taking the course of Instructional Technology and Material Design. The Technology Integration Self-Efficacy Scale, Self-directed Learning with Technology Scale and focus group interview were used to collect the data of the study. At the end of the research, it was found that prospective teachers' self-directed learning tendency scores were predictive both pre-test and post-test scores their technology integration self-efficacy beliefs.

Keywords: self-directed learning, self-efficacy, technology integration, prospective teachers

1. Introduction

The concept of Self -Directed Learning (SDL), has an important place in adult education. The concept of SDL has a similar meaning to the concept of lifelong learning and there is no clear definition (Su and Duo, 2010). The concept of SDL was first described by Tough (1966) and Knowles (1975) has an important role its improvement in the literature. SDL is defined as an approach involving cognitive processes that motivate learners to take personal responsibility (Garrisson, 1997; Knowles, 1975). According to Candy (1991), SDL is defined as the result of interaction with the surroundings without the knowledge being gained. It determines how students will

[i] Correspondence: email ebruli_2239@hotmail.com

approach their learning tasks (Guthrie, Solomon & Rinehart, 1997). The foundations of self-oriented learners began to be used in the 1920s, especially for adult learning purposes and became an important aspect of adult learning as much as day-to-day (Merriam, 2001). According to Mocker & Spear (1982), eight important factors depend on the individual being ready for self-directed learning: These are; ability to use learning skills, openness to learning opportunities, self-concept as an effective learner, learning initiative and independence, acceptance of informed responsibility, learning love, creativity, future orientation, basic work and problem-solving skills.

2. Literature Review

Ryan (1991) notes that it is useful to set up problem-based learning environments for the development of competencies such as taking responsibility and preparing prospective teachers for their profession. Corno (1992) suggests that teachers should encourage students to think so that they can gain self-monitoring habits. According to Patterson, Crooks, & Lunky-Child (2002), teachers with SDL skills are equipped with competencies such as having the ability to identify individuals' learning needs, reflecting knowledge, and critical thinking and assessment skills. Many, Fyfe, Lewis & Mitchell (1996) suggest that teachers should be examples of learning strategies such as predicting, asking, explaining, and summarizing.

When the literature was examined on concept of self-directed learning; it was seen that the researchers were investigated to subjects such as the place of self-directed learning in adult education (Garrisson, 1997; Spear & Mocker, 1984), the role of self-directed learning in teacher education (Bolhuis & Marinus Voeten, 2001), support for self-directed learning of prospective teachers using digital technologies (Bullock, 2013), the place of self-directed learning in language education (Su & Duo, 2010), the relationship between self-directed learning and self-regulated learning concepts (Abar & Loken, 2010).

It is considered that the ability to use technology effectively play an important role in the process of self-directed learning of the prospective teachers. When the definition of meaningful learning is made, it can be said that the learning process is facilitated by using information and communication technologies in the 21st century (Ertmer & Ottenbreit-Leftwich, 2010). But in today there are the obstacles to the improvement of information and communication technologies such as the curriculum, infrastructure, personnel development, obstacles stemming from management and organization, knowledge and skills, attitudes and beliefs and culture (Hew & Brush, 2007; Pelgrum, 2001). Researches were indicated that when the use of ICT as a separate subject area, it is taught students are not able to practice outside the classroom, and it is important that they use their skills regularly in connection with their subject areas in the class (Figg, 2000). According to Earle (2002), the ability to fully integrate technology is a matter of content and effective teaching practices. But according to researcher, there is a positive correlation between teachers' beliefs in using effective teaching methods and technology integration (Kim, Kim, Lee, Spector & Demeester, 2013).

Petko, Prasse & Cantieni (2018) pointed out that an effectively technology integration process depends on have six factors: namely the quality of educational technology, formal and informal teacher education, school perceptions, manager support and clear goals. But, individual factors have a significant effect on the technology integration than the factors in the school environment. According to Kopcha (2012), factors with related technology integration can be listed as problem-solving and critical thinking skills. Teachers' perception of technology use depends on technological knowledge and value judgments (Howard, 2013). Meanwhile, teachers' technological pedagogical content knowledge positively affects the technology integration (Abbitt, 2011). Technological tools' effective use is possible by integrating these tools with effective instructional strategies and selecting appropriate content. Teaching technology is never self-converting. Therefore, teachers need to integrate technology into their courses and use them to improve the learning of students (Kumar, Rose, & D'Silva, 2008). According to Zhao, Pugh, Sheldon & Byers (2002), the teachers are a part of the school environment and they have an ability to adapt innovations to the school environment. This structure is due to the integration of the education with technology at the Faculties of Education. When the literature is examined related to the technology integration, it is seen that the studies focus mainly such as prospective teachers' internet and computer usage skills (Erdemir, Bakirci & Eyduran, 2009, Eryilmaz, 2018, Hsu & Hargrave, 2000, Lambert, Gong & Cuper, 2008, Usta & Korkmaz, 2010) and prospective teachers' self-efficacy beliefs for technology integration (Abbitt, 2011; Anderson & Maninger, 2007; Ertmer, 2005; Wang, Ertmer & Newby, 2004).

3. The Important of the Study

This research is designed to determine prospective teachers' beliefs technology using the ability to adapt technology to learning environments by means of self-directed learning skills. In this context, prospective teachers should be able to perceive themselves adequately for technology; because this is the cause of successful applications in course design. Technology competencies are seen as one of the key skill areas of the teaching profession. When literature review was conducted, it was seen that prospective teachers were using technology to address issues related to self-directed learning tendencies and technology integration self-efficacy beliefs separately. It has been seen that there is no study examining the effect of prospective teachers' self-directed learning tendencies on self-efficacy beliefs in integrating technology into the classroom environment. It is taught that the research will be able to an important contribution to the literature and further studies.

The purpose of this research is to determine the effect of self-directed learning tendencies of prospective teachers on the self-efficacy beliefs of technology integration. In addition, prospective teachers' opinions of technology integration were researched. Within the scope of this purpose, the following questions were sought:

1. Do the prospective teachers' self-directed learning tendencies with technology predict pre-test scores of technology integration self-efficacy beliefs?

2. Do the prospective teachers' self-directed learning tendencies with technology predict post-test scores of technology integration self-efficacy beliefs?
3. What are the prospective teachers' opinions about technology integration?

4. Method

4.1. Research Design

This study was designed using a mixed method. According to Creswell (2008), the basic assumption of mixed method research is that qualitative and quantitative research methods are used together or blended. In this way, it is assumed that the research problem will be better analyzed by using these methods separately. Firstly, one group pretest-posttest model was used to collect quantitative data (see Table 1). Independent variables are applied to a randomly selected group. Pre-test and post-test measurements are made first and later the operation (Karasar, 2015). Beside focus group interview was used to collect qualitative data. According to Bowling (2002), the focus group interview is an unstructured interview between a small group and the leader, and group dynamics in discussion to use in-depth effect to acquire in-depth knowledge and to produce thought.

Table 1: One group pretest-posttest model

Group	Pre-test	Process	Post-test
Students who were taking instructional technology and material design course (G)	Technology Integration Self-efficacy Scale Self-directed Learning with Technology Scale (O1)	Instructional Technologies and Material Design courses were taught during the fourteen weeks (X)	Technology Integration Self-efficacy Scale Self-directed Learning with Technology Scale (O2) Focus Group Interview

4.2. Participants

The study group of the research consisted of prospective teachers (pre-test n = 170 and post-test n = 131) who are studying at the Faculty of Education (department of primary teacher, pre-school and Turkish language) located in Northwest Black Sea Region of Turkey during the spring semester of the 2016-2017 academic year and who are taking the course of Instructional Technology and Material Design. When the prospective teachers who attended at pre-test (n = 170) was examined by gender, it was seen that 72.6% of them were female (n = 132), 21.8% were male (n = 37) and 0.6% (n = 1) were not mentioned. When the prospective teachers who attended at pre-test were examined by the department, it was seen that 31.8% (n = 54) of them were pre-school prospective teachers, 11.2% (n = 19) were preservice Turkish teachers and 57.1% (n = 97) of them preservice classroom teachers. Finally, 0.6% of participants (n = 1) were not specified according to age variable; 62.4% (n = 106) were between 18 and 20 years of age; 30.6% (n

= 52) 21-22 years; 6.5% (n = 11) were found to be 23+ years of age. When the prospective teachers who attended at post-test (n = 131) was examined by gender, it was seen that 71.8% of them were female (n = 94), 26.7% were male (n = 35) and 1.5% (n = 2) were not specified. When the prospective teachers who attended at post-test were examined by the department, it was seen that 15.3 % (n = 20) of them were pre-school teachers, 22.1% (n = 29) of them were Turkish teachers and 62.6% (n = 82) of them were classroom teachers. Finally, 54.2% (n = 71) of them between 18 and 20 years old; 35.1% (n = 46) of them between 21-22 years old; 5.3% (n = 7) of them between 23+ years old and 5.3% (n = 7) of them were not specified according to age variable.

4.3. Data Collection Instruments

In order to determine the technology integration self-efficacy beliefs of the prospective teachers "Technology Integration Self-Efficacy Scale" which developed by Perkmen (2008) and adapted for physical education prospective teachers on a larger sample (N = 435) by Semiz (2011) was used in the research. The scale consists of 16 items and a one-factor structure. It was calculated the reliability coefficient of the 5-Likert-type scale is α: 0.95 by the researcher. Some examples of items of the scale are "I trust myself that I can use for instructional purposes" and "I trust myself that evaluate teaching and learning software."

In order to determine the self-directed learning tendencies of the prospective teachers "Self-directed Learning with Technology Scale" were used in the research. The Likert-type scale which 5 items was composed of 6 items and 2 factors in total. When the Cronbach reliability coefficients of the scale are examined, it was seen that α: 0.77 for the whole scale; α: 0.80 for the purposeful learning sub-dimension and α: 0.76 for the self-management sub-dimension. Examples of items on the scale include "I use an internet to ask my teachers questions about my lessons when I am not in the school" and "I use a computer to do better in a skill I care about, such as language learning."

The third data collection instrument was an interview form developed by the researcher/s, which included five open-ended questions related to the preservice teachers' experiences with technology integration self-efficacy. These questions were also controlled by two field experts who were studying at department of education. It gives some examples of the questions are: "What can make with technology integration at the Education Faculties?", What is the contribution of technology to your learning? etc.

4.4. Procedure

The data collected through the scales were analyzed using SPSS 22 statistical program. Firstly, technology integration self-efficacy scale and self-directed learning with technology scale were applied as a pretest to prospective teachers at the beginning of the spring semester of the 2016-2017 academic year. Later, the prospective teachers had taken the course of Instructional Technology and Material Design for 14 weeks and the scales were applied again as a post-test to them at the end of the spring semester. So a

comparison was made the scores of the prospective teachers' self-directed learning tendencies on the technology integration of self-efficacy beliefs.

A focus group interview was applied with seven students for 35-40 minutes as a pilot practice at the end of the semester to support the prospective teachers' technology integration of self-efficacy beliefs with the qualitative data. So the interview form was given the final form. After this operation, the real focus group interviews were conducted with ten students for 40-45 minutes. The actual practice was carried out on a group consisting of 3 male and 7 female students. According to Edmunds (2000), the focus group interview should be conducted with 8-10 people. If the group is more than 10 people, it can reduce the dynamic of the group, decrease the interaction between the participants and make the control of the group even more difficult.

5. Results

5.1. Quantitative Data Analysis

In this section, the quantitative data results are presented in the research. The data which obtained from the scales were analyzed using regression analysis. The effect of prospective teachers' self-directed learning tendencies on the technology integration of self-efficacy beliefs was examined in the course of Instructional Technology and Material Design.

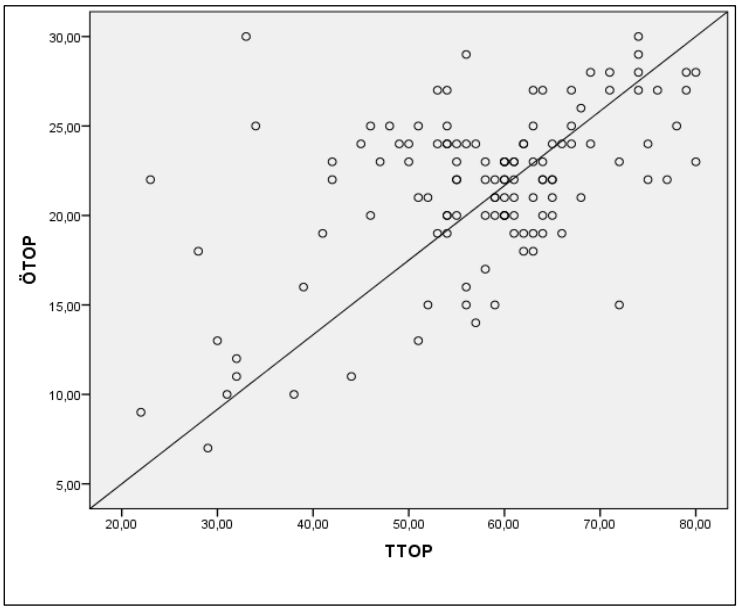

Figure 1: A scatter diagram and regression line for prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables for pre-test

When Figure 1 is examined, it can be said that there is a linear relationship between prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables for the pre-test.

Table 2: Pre-test scores for the prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables

	B	Standard Error	B	t	p	Zero-order r	Partial r
Constant	46,569	3,406	-	13,674	,001		
Self-directed learning Sum	,573	,147	,302	3,900	,001	,302	,302

R= 0,302 R^2 =0,91
F(1,153)=15,214 p=0,001

When Table 2 is examined, it appears that prospective teachers' self-directed learning tendencies are a significant predictor of their pre-test scores of technology integration self-efficacy beliefs (R = 0.302; R2 = 0.91; p < 0.01). When pre-test scores are examined, it can be said that prospective teachers' technology self-directed learning tendencies explain approximately about 30% of technology integration self-efficacy beliefs.

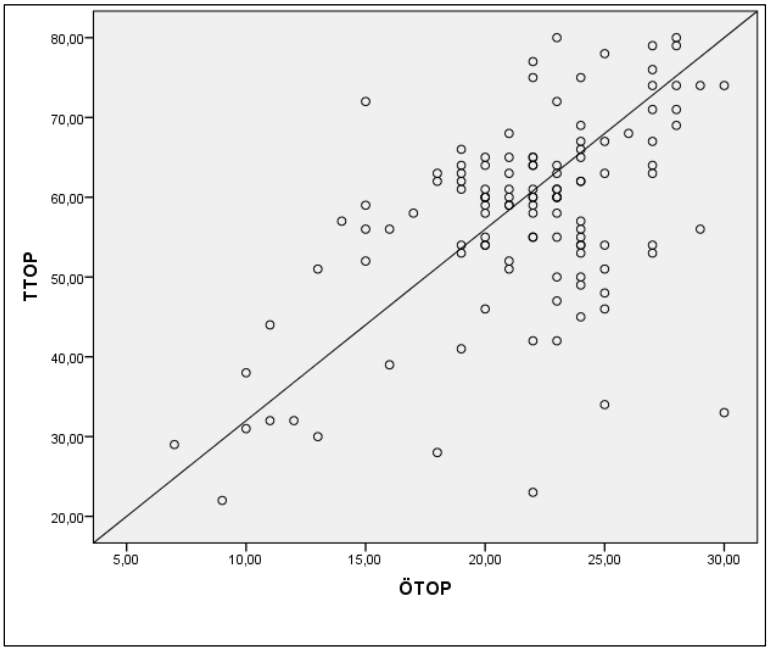

Figure 2: A scatter diagram and regression line for prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables for post-test

When Figure 2 is examined, it can be said that there is a linear relationship between prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables for post-test.

Table 3: Post-test scores for the prospective teachers' technology integration of self-efficacy beliefs and self-directed learning tendencies variables

	B	Standard Error	B	t	p	Zero-order r	Partial r
Constant	26,964	4,660	-	5,787	,001		
Self-directed learning Sum	1,422	,211	,526	6,744	,001	,526	,526

R= 0,526 R^2 =0,277
F(1,120)=45,486 p=0,001

When Table 3 is examined, it appears that prospective teachers' self-directed learning tendencies are a significant predictor of their self-efficacy beliefs post-test scores (R = 0.526; R2 = 0.277 p< 0.01). When the post-test scores were examined, it can be said that prospective teachers' technology self-directed learning tendencies explain approximately 52% of their technology integration self-efficacy beliefs.

5.2. Qualitative Data Analysis

In this section, the qualitative data results are presented in the research. The focus group interview form was analyzed using content analysis.

a) The question "How does technology contribute to your learning process?" was asked to determine the prospective teachers' technological use in their education period and the answers were expressed as follows:

S1: I can access the information in a short time.
S2: Using images and videos will contribute to my learning.
S3: The lesson will contribute to a better understanding.
S5: It provides us to reinforce the issues.
S6: Provides access to more information.
S9: Because of the opportunity to practice, what we learn is more permanent.
S10: It allows me to recognize different cultures and people I am curious about.

When the answers given by prospective teachers are examined, it appears that they think that technology has a positive influence on their learning. In a short period of time, it seems that more information technology means that they have reached and that the learners are more permanent.

b) The question "Are you feeling good about designing course material using technology?" was asked and the answers given by the prospective teachers are expressed as follows:

S1: I do not find; because I do not think I have the necessary knowledge and equipment. I believe I need to improve myself.
S2: I think I am enough; because thanks to our homework we prepare many presentations and materials. I think that I can contribute to my students by further improving this situation in the future.
S4: I find it sufficient to prepare the presentation, but I do not find myself doing enough video-style homework.

S7: Yes. We have already prepared material for a course.
S8: No. I do not think I can use the computer well. I have concerns.
S9: Yes. I think I learned as much as I can.
S10: Yes. This year I think I have prepared enough presentations and course material.

It was found that a large majority of prospective teachers have seen themselves sufficiently to prepare course materials using technology. This situation can be interpreted as the fact that the prospective teachers perceive themselves adequately on technology related issues as a result of taken a course with the Instructional Technology and Material Design.

c) The question "How can we use the technology more effectively at the Education Faculties" is directed to the prospective teachers and the answers given by the prospective teachers are expressed as follows:

S1: Projection systems should be renewed, separate classes for practical courses should be organized, and computer laboratories should be renewed.
S2: I think the computer lab is inadequate. For the number of computers is low, sufficient teaching is not possible. Areas of technology can be constructed to contribute to theater, art, and music. An electronic library can be created.
S3: Lessons can be processed using videos and images so that topics can be understood better.
S4: Science and arts-related conferences can be broadcast live.
S6: Computers can be replicated. Seminars and courses can be arranged.
S7: The course can be effectively processed by dividing the course hours into two days; because constantly looking at the computer is a lot of eye strain.
S9: Lessons can be processed over the internet. Technology-intensive assignments can be given.
S10: A larger library can be built and more computers can be installed.

Prospective teachers think that the amount of the computers is inadequate at the faculty. In order to enable to be used the technology effectively at the Faculty of Education, they were suggested some proposals such as the elimination of infrastructure problems in libraries and computer laboratories, processing of lessons on the basis of technology, a division of computer lessons into more efficient ones, the arrangement of seminars and courses. This finding can be interpreted that the prospective teachers have practical ideas in order to make the educational environment more effective.

6. Discussion

In the study, it was investigated that prospective teachers' self-directed learning on technology integration self-efficacy beliefs. In addition, prospective teachers' views on technology integration were examined. At the end of the research, it was determined that prospective teachers' self-directed learning was predicted technology integration self-efficacy beliefs a low level at pre-test scores and a high level of post-test scores. It was also found that the opinions of prospective teachers' on technology integration support quantitative results. As a result of the research, self-directed learning of prospective teachers predict on technology integration self-efficacy beliefs both pre-test

scores and post-test scores. This result shows that it can benefit from self-directed learning tendencies of prospective teachers in determining the ability to integrate technology into the classroom environment.

This result was also found in similar studies in the literature (Adıguzel & Yuksel, 2012, Ball Anthony, 2012, Cullen & Greene, 2011, Çakır & Yıldırım, 2009, Demir & Bozkurt, 2011, Ertmer, 2005, Inan & Lowther, 2010, Keser, Karaoğlan Yılmaz & Yilmaz, 2015, Kim, Kim, Lee, Spector & Demeester, 2013, Petko, Prasse, & Cantieni, 2018). Firstly Keser, Karaoğlan Yılmaz & Yilmaz (2015) found that prospective teachers' self-efficacy perception level for technology integration were high. Although, Adıguzel & Yuksel (2012) said that all teachers are trained in the use of instructional technologies, they have sometimes experienced problems in the integration of technologies. Beside Ball Anthony (2012) notes that the frequency and nature of teachers' use of technology are dependent on out-of-class technology links. The results of the study by Çakır & Yıldırım (2009) reveal that ICT prospective teachers and teachers believe that there are many factors affect technology integration at schools (such as crowded classes, limited access and inadequate knowledge of teachers). Also, Demir & Bozkurt (2011) indicate that factors affecting technology integration are teachers' experience with technology and their use of technology. Meanwhile, Ertmer (2005) states that teachers' beliefs affect technology integration of classroom practices and teachers' professional development. Beside, Inan & Lowther (2010) reviewed those successful technology implementations based on views of school administration. Kim, Kim, Lee, Spector & Demeester (2013) stated that there is a positive correlation between teachers' beliefs about using effective teaching methods and technology integration. Finally, Petko, Prasse, & Cantieni (2018) pointed out that the prospective teachers' knowledge of their readiness for technology integration links to their knowledge and skills in their work. These results show that there are many factors that affect the integration of technology in the school environment and these factors can affect the technology integration as a positive or negative. Also, it is seen that the prospective teachers see themselves adequately in the issues related to technology in the literature.

At the end of the research, it was reached that the prospective teachers believe that technology has a positive influence on their learning. Similar findings are also found in other researches in the literature (Abbitt, 2011; Caba & Ergün, 2016; Kopcha, 2012; Murat & Erten, 2017; Pareja, Tondeur, Voogt, Bruggeman, Mathieu & Braak, 2018). Firstly, Abbitt (2011) notes that there is a positive relationship between teachers' TPACK beliefs and technology integrations. Secondly, in the study conducted by Cabı & Ergün (2016) it was determined that the Instructional Technology and Material Design course effect of the prospective teachers on the task-centered and increasing of the technology disadvantage-restriction centered concerns. Beside, Kopcha (2012) notes that there is a positive relationship between using technology and supporting classroom teaching. Also, in their research, Murat & Erten (2017) found that the integration of ICT into the teaching process is very beneficial for science prospective teachers and they had gained time for them, facilitated their work, and increased the interest of students.

Finally, Pareja, Tondeur, Voogt, Bruggeman, Mathieu & Braak (2018) point out that PC computers use of in the editing of the learning environment is injured.

At the end of the research, it was found that the prospective teachers have seen themselves enough to prepare the course materials by using the technology. After the literature review, it conducted similar findings in the studies (Bayat, Zayimoglu Öztürk & Öztürk, 2016; Betrus & Molenda, 2002; Duman, 2013; Erdemir, Bakırcı & Erduran, 2009; Smoke, 2013). Firstly, Betrus & Molenda (2002) stated that there were differences between teachers' practices and their taughts in the course of instructional technology. Secondly, Erdemir, Bakırcı & Erduran (2009) stated that prospective teachers can prepare simple materials for teaching purposes and they cannot prepare complex and multi-purpose teaching devices. On the other side, Bayat, Zayimoglu Öztürk & Öztürk (2016) stated that the prospective teachers had some problems in creating creative materials. They were reluctant to work and did not have enough expert according to their teacher opinions during their studies. Finally, Smoke (2013) states that the software that measures the speech ability of CDs prepared for teaching English is effective in teaching Turkish to advanced materials that warn when not correctly pronounced.

7. Recommendations

Prospective teachers offered suggestions such as eliminating infrastructure problems at libraries and computer laboratories, processing lessons based on technology, making ICT courses more efficient by dividing ICT courses hours, organizing seminars and courses to use technology more effectively in the Faculty of Education. In the light of these results, the following suggestions were made: It can be said that integrate the ability of the prospective teachers the technology correctly into the classroom environment depends on their self-directed learning tendencies. It would be appropriate for the prospective teachers to be mainly involved in technology-aided practices throughout their teacher training in order to improve this skill. Beside the researches were designed by the researchers self-directed learning and other educational concepts (motivation, achievement, attitude, etc…).

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